Rapid Ecological Assessment of the
Newbury Town Forest, West Newbury, VT

for the Vermont Land Trust

Part I: Tucker Mountain East
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For information on the Newbury Town Forest land north and west of Tucker Mountain, see Part II of this report, prepared by Anya Tyson.
I. EXECUTIVE SUMMARY

The Vermont Land Trust (VLT) is working with the Town of Newbury (Orange County) on a proposed town forest expansion project. This project would grow the town forest by approximately 600 acres, spread over multiple parcels owned by descendants of the family of Philip and Virginia Leach (Figure 1). Little is known about the ecological significance of either site.

In September 2016, two graduate students from the UVM Field Naturalist Program, Hannah Phillips and Anya Tyson, conducted a three-day rapid ecological assessment of the property at VLT’s request. The objectives of the September 2016 visit to the site were to increase VLT’s ecological knowledge of the property, with the primary goal of identifying state-significant natural communities and significant wildlife habitat.

The project was completed in three days, consistent with the requirements of the UVM Field Naturalist Program Comprehensive Exam. Because of the nature of the exercise, this report was completed in two parts: Part I, prepared by Hannah Phillips, addresses the land east of Tucker Mountain; Part II, prepared by Anya Tyson, addresses the land west and north of Tucker Mountain.

The proposed town forest is ecologically-significant for its size, variation in landscape types, connectedness to other conservation blocks, and abundance of ecologically-significant features. Property highlights include:

- Seven natural community types, including Red Maple-Black Ash Seepage Swamp (S4), Red Spruce-Cinnamon Fern Swamp (S3), Rich Northern Hardwood Forest (S4), Mesic Red Oak-Northern Hardwood Forest, Northern Hardwood Forest (S5), Seeps (S4), and Vernal Pools (S3).
- Three state-significant natural community element occurrences:
  - Red Spruce-Cinnamon Fern Swamp (S3); B-ranked.
  - Red Maple –Black Ash Seepage Swamp (S4); B-ranked.
  - Seep (S4); B-ranked.
- 33.5 acres of wetland comprising ~9% of the acreage east of the summit of Tucker Mountain.
  - Beaver meadow wetland complex is a Class II wetland in the VT Significant Wetland Inventory.
  - Forested wetlands qualify as Current Use Ecologically-Significant Treatment Areas (ESTAs).
- Two vernal pools offering amphibian breeding habitat.
- Matrix forests in varying stages of stand development; early successional softwood forests on the east; mid-successional hardwood forests in the central part of the property.
- Two seeps on calcareous Waits River Formation bedrock with potential for rare or uncommon plants.
- Abundant wildlife resources, including early successional habitat, hard and soft mast-producing species, and wetlands.

II. BACKGROUND

The parcels in question are collectively owned by descendants of the Phillip and Virginia Leach Family. Four hundred and ninety-three of these acres are already protected by a conservation easement held by the Vermont Land Trust since 1992. An adjacent 142 acres owned by Ted (Edwin) and Deborah Leach are now for sale, and negotiations are underway with VLT regarding the purchase of the property. If acquired, this parcel would link Tucker Mountain and the Leach land to a 116-acre parcel north of Woodchuck Mountain, which will likely be conveyed to the Town of Newbury from the Vermont Department of Forest, Parks, and Recreation (Figure 1).

Three other reports have documented various aspects of the property. A Baseline Documentation Report (BDR) was completed in 1992 when the owners donated a VLT conservation easement on the 493-acre parcel. In 2010, Jeffrey Smith of Butternut Hollow Forestry prepared a Forest Management Plan for 493-acre Leach family land. Finally, VLT Conservation Ecologist Allaire Diamond conducted a remote ecological assessment of the property in 2015.
Figure 1: Current Ownership of the Proposed Newbury Town Forest, Newbury, VT.
III. SITE DESCRIPTION:

A. Geography

The Leach land is perched in a zone of transition, where the Connecticut River Valley meets the Orange County Hills. The proposed Newbury Town Forest exists entirely within the Town of Newbury, Vermont, in the the Northern Vermont Piedmont biophysical region, which spans the eastern foothills of the Green Mountains from the Waits River to the Canadian border. However, the land’s proximity to the Connecticut River valley lends it moderate climactic conditions that generally dominate the Southern Vermont Piedmont (Thompson and Sorenson 2000).

B. Watershed Context

The proposed Newbury Town Forest ranges in elevation from ~1100 feet at the eastern edge of the property, to over 1700 feet at the summit of Woodchuck Mountain. The Tucker Mountain-Woodchuck Mountain ridgeline divides the headwaters of two sub-watersheds of the Connecticut River. East of the Tucker Mountain and Woodchuck Mountain summits, the Halls Brook headwaters drain to the Connecticut River. West of the summits, water drains via Hedgehog and Meadow Brooks to the Waits River before flowing on to the Connecticut River.

C. Bedrock

The proposed Newbury Town Forest is underlain by meta-sedimentary bedrock of the Gile Mountain Formation and the Waits River Formation, laid down during the Lower Devonian and Upper Silurian periods, and later metamorphosed during the Taconic, Alleghenian and Acadian Orogenies. The eastern half of the parcel is underlain by a noncarbonaceous quartz schist interbedded with quartzite (Gile Mountain Formation), while the western half of the parcel is dominated by a micaceous quartzite (Gile Mountain Formation; Ratcliffe et al. 2011). A band of carbonaceous metalimestone (Waits River Formation) runs north to south adjacent to the summits of Tucker Mountain and Woodchuck Mountain (Ratcliffe et al. 2011).

D. Surficial Geology

Like much of Vermont, West Newbury was covered by the Laurentide Ice Sheet approximately 15,000 years ago. The advance and retreat of the glaciers left a nearly ubiquitous blanket of till covering the landscape; the hills of Orange County are no exception. Throughout the region, sedimentary deposits from glacial meltwater dot the landscape, feature varying degrees of sorting. At the time of the glacial retreat, West Newbury would have been near the shores of Glacial Lake Hitchcock, which filled the Connecticut River Valley to elevations of approximately 600 feet (Bigl 2013).

E. Soils

The majority of the proposed Newbury Town Forest is on Tunbridge-Woodstock rocky fine sandy loams. Poorly-drained Peacham mucky peat (Hydrologic Group D) and Cabot silt loam (Hydrological Group D) dominate the wetlands in the northeast corner of the property, while the upland soils of the eastern half of the property are primarily Colrain stony fine sandy loam (Hydrologic Group A) and Buckland loam (Hydrologic Group D). Intrusions of Cabot silt loam, Buckland loam and Colrain stony fine sandy loam appear occasionally in the major drainages around the property (Figure 2).
Figure 2 Soils of the Proposed Newbury Town Forest, West Newbury, VT.
F. Landscape Context:

The Nature Conservancy Resilience Dataset ranks the proposed Newbury Town Forest as “slightly above average” for landscape connectedness (Appendix B, Anderson et al. 2012). Protecting connected wildlife corridors will allow species sensitive to a warming climate to travel to more suitable habitats as the climate changes. The Tucker Mountain-Woodchuck Mountain ridgelines offers a stopping ground between the Groton State Forest to the northwest, the Fairlee Town Forest to the south (>1500 acres of woods and wetlands), and the White Mountain National Forest to the east.

Within Vermont, Vermont Conservation Design has modified The Nature Conservancy Resiliency methodology to help guide landscape conservation efforts within the state (Sorenson et al. 2015). The landscape elements they identify as crucial to maintain an ecologically functional landscape are 1) interior forest blocks, 2) connectivity blocks, 3) surface waters and riparian areas, 4) riparian areas for connectivity, and 5) physical landscape diversity blocks. This model ranks the proposed Newbury Town Forest as containing a ‘Moderate’ to ‘Very High’ concentration of components contributing to a resilient landscape (Appendix C). On the western half of the property, the low-to-mid elevation calcareous bedrock boosts the rating to ‘High,’ while in the east the wetland complex and Halls Brook drive the ranking to ‘Very High’; the matrix forest of the eastern half of the property is of ‘Moderate’ significance.

Additionally, although outside of the scope of the Staying Connected Wildlife Initiative Priority Linkages, the proposed Newbury Town Forest offers another potential linkage between the Orange Hills and the White Mountains (Hawk et al 2012). The White Mountains serve as a gateway to the Northern Forest expanse in Maine and Quebec.

The proposed Newbury Town Forest is located squarely within The Nature Conservancy’s Pine Hill Matrix Block, an area identified as priority for forest conservation projects based on their representative “matrix” forest community, minimal interruption by large roads, and representative physical landscapes (Anderson 2005).
IV. **SIGNIFICANT ECOLOGICAL FEATURES** (see Figure 3):  

**NTF-1: Red Maple-Black Ash Seepage Swamp (S4; State-Significant, B-rank; 8.03 acres)**

This seepage swamp is adjacent to the beaver meadow; undoubtedly the hydrology of this site has been influenced by the downslope beaver activities (see photo, Appendix D). This community has been heavily altered by recent logging, and a logging road passes through the community near where the east arm meets the main body of the wetland. Although the community structure has been heavily altered in the western arm, the presence of characteristics herbaceous species (including *Rubus pubescens, Impatiens* spp., *Geum rivale*), black ash, red maple, and red spruce in the overstory, and saturated soils suggests that this area is perpetually wet. A prow of upland mixed forest bisects the wetland down the middle. Soils within this community are organic to approximately 8” deep, below which a dense, sandy-silty composite inhibits water percolation (likely till-derived). Both the dense sandy substrate and the organic muck were close to neutral (pH 6.5). I assigned this community a B-rank for size, a C-rank for condition (due to recent logging throughout the polygon), and a B-rank for landscape context.

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<tr>
<th>Trees/Shrubs</th>
<th>Herbaceous</th>
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</thead>
<tbody>
<tr>
<td><em>Fraxinus nigra</em></td>
<td><em>Carex gynandra</em></td>
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<tr>
<td><em>Acer rubrum</em></td>
<td><em>Impatiens capensis</em></td>
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<tr>
<td><em>Betula allegheniensis</em></td>
<td><em>Tiarella cordifolia</em></td>
</tr>
<tr>
<td><em>Picea rubens</em></td>
<td><em>Carex trisperma</em></td>
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<td><em>Abies balsamea</em></td>
<td><em>Chrysosplenium americanum</em></td>
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<tr>
<td><em>Fraxinus americana</em></td>
<td><em>Osmunda cinnamomea</em></td>
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<tr>
<td></td>
<td><em>Geum rivale</em></td>
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<tr>
<td></td>
<td><em>Rubus pubescens</em></td>
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</table>

**NTF-2: Beaver Ponds (15.92 acres)**

The beaver ponds in the center of the wetland complex are recognized as a Class II Wetland in the Vermont Significant Wetland Inventory (see photo, Appendix E). I observed no signs of current beaver activity during my visit; I did not see an active beaver dam, nor did I see recent signs of beaver feeding. Additionally, while the Forest Management Plan, written in 2010, makes mention of numerous species of waterfowl using the pond, no waterfowl were observed during this visit. I followed the beaver impoundments up Halls Brook to the west and found a series of small dams which terminate where the brook crosses the road. There are no signs of beaver activity below the major beaver pond.

Electroconductivity, measured at the point where the western arm of the beaver meadows meets the main beaver pond, was 71 mS, compared to 72 mS at the point where the Halls Brook exits the beaver pond. In the northeast corner of the pond where the Red Maple-Black Ash Seepage Swamp meets the beaver pond, electroconductivity was 55 mS. None of these values are abnormally high to suggest that water is seeping from the ground, indicated by a higher presence of conductive cations.

It is unclear how continued beaver absence will impact the seepage communities above and below the wetland complex. With water traveling a more focused course through the center of the complex via Halls Brook, it is not clear if the forested wetlands adjacent will retain their saturated, mucky soils.
A Red Spruce-Cinnamon Fern Swamp runs in a narrow band south from the end of the beaver pond (see photo, Appendix F). Although this area was harvested in the past (stumps are present throughout), it appears to have been spared during the most recent round of harvest. Dense bryophyte cover blankets the ground, and red spruce, the dominant canopy tree, forms a mat of roots on which other species take hold. Hemlock, yellow birch, red maple and black ash are present in the mid- and overstory, and striped maple and beaked hazelnut are common understory shrubs. Herbaceous vegetation on the ground is starkly divided between that growing on the hummocks and that growing in the hollows, with acidic-tolerant upland species growing atop the bryophyte mats and species favoring moisture and enrichment growing in the hollows.

In many respects, this wetland more closely fits the description of a Hemlock-Balsam Fir-Black Ash Seepage Swamp. Structurally, this wetland has many of the same characteristics of seepage swamps including hummock/hollow topography, buttressed roots, and tip-ups. The species composition includes some species that prefer mineral enrichment (*Chrysosplenium americanum*, *Glyceria melicaria*), and the close-to-neutral pH (6.5) in the hollows indicates water flow through the organic muck layer. However, the red spruce canopy dominance and the “perched” red spruce root layer on which the bryophyte layer develops and the majority of herbaceous vegetation is growing drives this community to express itself as primarily acidic.
The natural community characteristics of the wetland downstream of the beaver meadow are unrecognizable given the recent logging that passed through here. However, the saturated Peacham muck soils would likely support a wetland community similar to the Red Spruce-Cinnamon Fern Swamp just upslope (NTF-3). If this land is conveyed to the Town of Newbury with a VLT easement, this area should be demarcated as a no-touch zone.

**NTF-5: Hemlock-Balsam Fir-Black Ash Seepage Swamp (S4; 1.31 acres)**

A 1.3-acre Hemlock-Balsam Fir-Black Ash Seepage Swamp is perched just south of the road, in line with the main wetland complex. This wetland was abnormally dry this summer, though mottling in the A-layer suggests fluctuations in the water table are not uncommon. In the center of the wetland, five inches of organic matter was perched atop a mottled grey, dense sandy A-layer of unknown depth. The pH in both layers was 6.5. Deer beds were observed in the middle of the wetland. Lastly, given the location of the wetland, it seems plausible that prior to road construction, this wetland would have been part of the larger wetland complex that features a Red Spruce-Cinnamon Fern Swamp downstream.

<table>
<thead>
<tr>
<th>Trees/Shrubs</th>
<th>Herbaceous</th>
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<tbody>
<tr>
<td>Acer rubrum</td>
<td>Tiarella cordifolia</td>
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<td>Abies balsamea</td>
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<td>Pinus strobus</td>
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<td>Quercus rubra</td>
<td>Solidago canadensis</td>
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<td>Sympyotrichum puniceum</td>
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<td>Onoclea sensibilis</td>
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<tr>
<td>Spiraea tomentosa</td>
<td>Osmundastrum cinnamomeum</td>
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<td>Bidens cernua</td>
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<td>Impatiens sp.</td>
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<tr>
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<td>Equisetum sp.</td>
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<tr>
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<td>Chrysosplenium americanum</td>
</tr>
<tr>
<td></td>
<td>Micranthes pensylvanica</td>
</tr>
<tr>
<td></td>
<td>Sparganium sp.</td>
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</tbody>
</table>

**NTF-6: Wetland-Unclassified (0.38 acres)**

A small (0.38-acre) seep appears altered by logging traffic. If the Town acquires this property, it is recommended that this seep/wetland is left to reforest, at which time another ecological evaluation may be better able to comment on the significant components within.
NTF-7: Vernal Pool (S4; 0.07 acres)

A small vernal pool has formed in a small depression at the inflection point of the adjacent slope. Although dry at the time of survey, the compressed, muddy leaves and lack of vegetation indicate seasonal saturation. Canopy cover above the vernal pool is good, and there is downed woody debris providing structural complexity below the presumed water level. This vernal pool should be revisited in the spring to verify the presence/absence of breeding amphibians. The proximity of this vernal pool to the unnamed wetland (NTF-6) bodes well for breeding amphibians.

NTF-9: Wetland – Unclassified (0.09 acres)

A small wetland is perched in a hollow on the southern boundary border in the central part of the property. An intermittent stream appears to flow through the middle, although it was dry during this visit. I did not follow it off-site.

<table>
<thead>
<tr>
<th>Trees/Shrubs</th>
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<td>Acer pensylvanicum</td>
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<tr>
<td>Acer rubrum</td>
<td>Laportea canadensis</td>
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<tr>
<td>Fraxinus americana</td>
<td>Impatiens sp.</td>
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<tr>
<td></td>
<td>Tiarella cordifolia</td>
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</tbody>
</table>

NTF-10: Red Maple-Black Ash Seepage Swamp (S4; 0.42 acres)

A small Red Maple-Black Ash Seepage Swamp (0.42 acres) is hidden in a valley south of the summit of Tucker Mountain, adjacent to NTF-11 and NTF-12 (see photo, Appendix G). Though I had to move quickly through this community during my visit to the site, Anya Tyson’s report offers further details about this polygon. Notably, although a road passes adjacent to the wetland and through NTF-11 and NTF-12, this area appears relatively unaltered and the most unaltered example of a hardwood swamp on the land I surveyed. Depth of organic matter at the edge of the swamp was greater than one meter, and the nutrient enrichment from the Rich Northern Hardwood Forest and Seep upslope likely give rise to other, undocumented plants of interest in the swamp.

<table>
<thead>
<tr>
<th>Trees/Shrubs</th>
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</thead>
<tbody>
<tr>
<td>Picea rubens</td>
<td>Osmundastrum cinnamomeum</td>
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<td>Fraxinus nigra</td>
<td>Symphyotrichum puniceum</td>
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<td>Acer rubrum</td>
<td>Impatiens capensis</td>
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<td></td>
<td>Typha sp.</td>
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</table>

NTF-11: Seep (S4; State-Significant, B-rank; 0.19 acres)

A small seep spans the distance between the upslope Rich Northern Hardwood Forest (NTF-12) and the downslope Red Maple-Black Ash Seepage Swamp. Although I visited this area late in the day and did not have time to linger, the richness expressed in the forest above may give rise to undocumented plants of interest in this area. Please see Anya Tyson’s report for more detail on this polygon. On first pass, I gave this area a C-rank for size, a B-rank for condition (a small ATV trail passes along the edge of the seep), and a B-rank for landscape context (logging upslope may have had mild effects on the seep).

<table>
<thead>
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<th>Trees/Shrubs</th>
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</thead>
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<tr>
<td>Acer saccharum</td>
<td>Rubus pubescens</td>
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</table>
NTF-12: Rich Northern Hardwood Forest (S4; 2.64 acres)

Upslope of NTF-10 and NTF-11, a beautiful, hidden cove of large-DBH, towering sugar maples capitalizes on the richness expressed in the soils and herbaceous layer. Although I did not have time to linger, *Aquilegia canadensis* and *Asarum canadense* both jumped out to me as I was leaving the cove, attesting to the richness on site. The eastern bank of this ravine is comprised of large talus blocks. The forest itself has a higher degree of structural complexity than elsewhere on the property: large standing dead snags and huge fallen trees suggests that this area has not been altered in some time. This cove, with its habitat heterogeneity, may serve as a wildlife haven.

NTF-13: Vernal Pool (S3; 0.25 acres)

A large vernal pool sits in an odd arrangement below the open field at the summit of Tucker Mountain (see photo, Appendix H). Perched adjacent to a stone wall and a large, open grown yellow birch, the vernal pool (dry now) featured 12cm of organic matter (pH 6.5) atop 24 cm of a dense, silty sandy A-layer (pH 7.5). Below this, a B-layer comprised of coarse sand descended to unknown depths (pH 7.0). This substrate is perplexingly out of the place at an elevation of ~1600 feet, and I postulate that it may be a function of land use history on site, from a time when the field was plowed for agriculture.

Although the vernal pool was not holding water at the time of my visit, it did host a suite of wetland plants around the edges, including *Onoclea sensibilis*, *Pilea pumila*, *Chrysosplenium americanum*, *Scirpus cyperinus*, *Mentha canadensis*, and *Persicaria punctata*. This site should be revisited in the spring to check for the presence of breeding amphibians.

NTF-14: Seep (S4; 0.06 acres):

This seep functions as the headwaters of Halls Brook, and appears to emerge from a water source that is hydrologically separate from the aforementioned vernal pool. Below the vernal pool, a steep “headwall” descends to a concave slope-bottom, where the seep emerges. The water coming from the seep has an astonishingly high electroconductivity rating, at 227 mS. One interpretation of this peculiar arrangement and high EC-value is that the water may have been in contact with meta-limestone bedrock of the Waits River formation for some time, and bring with it a good deal of mineral enrichment.

Despite the predicted high nutrient input, the plants observed were similar to those observed in other seeps, including: *Chrysosplenium americanum*, *Impatiens capensis*, *Geranium robertianum*, *Tiarella cordifolia*, *Hydrocotyle americanum*, *Epipactus helleborine*, *Symphyoticum lanceolatum*, and *Micranthes pensylvanica*.

**Halls Brook**

I walked Halls Brook from the lower wetland (NTF-4) to the property boundary. Despite this summer’s drought, the stream was flowing steadily through the property with minimal obstructions. The stream reached a maximum width of nine feet, a maximum depth of fourteen inches, and the water temperature fluctuated around 70 degrees. Canopy cover over the stream was excellent, and the streambed was rocky with few fine sediments. When flipping over rocks, I found numerous caddisfly cases, dragonfly nymphs, stoneflies, and a northern dusky salamander (*Desmognathus fuxus*). The macroinvertebrates identified are especially sensitive to pollution, so their presence indicates the water in the stream is healthy.
Figure 3 Significant Ecological Features of the Proposed Newbury Town Forest, Newbury, VT.
V. OTHER NATURAL FEATURES

Matrix Forests

The matrix forest east of Tucker Mountain has been altered significantly by logging. Operations were underway during my visit, and my observations of harvested trees on the landings, and the trees marked in the forest revealed a large number of large, healthy red oaks marked for removal on the steeper slopes abutting Tucker Mountain. The quantity of oaks, and also the surprisingly high number of hop hornbeam on the dry, shallow soils led me to believe this community may best be described as a Mesic Red Oak-Northern Hardwood Forest variant. Although the slope is not south-facing, the shallow, well-drained soils and warm climate due to proximity to the Connecticut River explain these normally warm site species.

Further east on the shallower slopes of the Newbury Town Forest lowlands, a more typical Northern Hardwood Forest is growing. While logging through the parcel has altered the community structure with time, the abundance of beech, red maple, sugar maple, red oak, and hemlock reveal a classic warm-site derivative of Vermont’s most common matrix forest.

Old Fields – Early Successional Forest (12.33 acres)

A series of old fields, in varying phases of succession, flank the smaller branch of beaver ponds adjacent to the wetland complex, and both sides of Halls Brook in the easternmost portion of the parcel. The stands adjacent to the beaver ponds are likely 15-20 years old, and are nearly impassable with dense softwood cover.

The stands adjacent to Halls Brook are in a later stage of succession, and may have been in fields closer to 30 years ago. Since then, the understory has been thinned and a new crop of trees, primarily balsam fir and white pine, has started growing beneath. Because agricultural practices on the land likely decimated the seed bank, natural regeneration of the original community type may take time (if left to regenerate by natural processes), or may require more direct management. It is not clear whether the resulting community would be hardwood or softwood dominated, as attempts to locate unaltered vegetative communities in a similar landscape position were fruitless.

VI. WILDLIFE SIGNIFICANCE

The Leach land is a forested haven for wildlife in a patchily agricultural landscape; food of all types is abundant. The beaver wetland and adjacent forested wetlands are likely a destination for large mammals seeking to avoid humans and feed on lush summer vegetation. The red oaks provide ample hard mast, and the recently harvested areas provide soft mast in the *Rubus* that dominates the understory.

The wide range of successional habitats in the forests on the property cater to a variety of habitat preferences, though trend towards early-successional forest dwellers; animals craving dense softwood cover need not look far beyond the bounds of the wetland complex. While traversing the property, I startled two white-tailed deer, observed moose scrapings on striped maple, and identified coyote scat. Additionally, I saw what I believe was black bear scat beneath a large, healthy red oak.

VII. RECOMMENDATIONS FOR FOLLOW-UP

- Vernal pools should be inventoried in the spring to check for the presence/absence of breeding amphibians.
- A more detailed analysis of NTF-10 – NTF-13 in different seasons (especially spring) may reveal a greater number of calciphilic species.
- Wildlife cameras in the wetland, in an area with high red-oak density, and in the ravine by NTF-10 may help log wildlife on the property.
VIII. CONCLUSIONS

The proposed Newbury Town Forest derives its ecological significance from its size, landscape context, variety of natural community types, and habitat potential for wildlife. Management planning should take into consideration the attributes of the landscape that provide conservation value, including the following:

- A vegetative species assemblage that is responsive to a changing climate (e.g., red oak, hophornbeam)
- A connected landscape that allows for lateral and elevational range shifts for vegetative species and wildlife, both with adjacent parcels and within focal parcels
- A forest with heterogeneous structure and age, offering wildlife value and requiring ongoing forest management
- Mast-producing tree species that provide a food source for wildlife
- Wetland communities that provide vegetative biodiversity, habitat heterogeneity, and wildlife value

The proposed town forest may support multiple uses, including forest management and recreation, while also protecting the ecological integrity of the site. Further assessment of the seeps and vernal pools on site may reveal individual species of interest, and a deeper study of wildlife activity on the property (via a wildlife camera) will help predict how management decisions will impact wildlife visitation. While not the focus of this assessment, further study of the land use history and cultural significance of the site may help guide planning decisions.
IX. REFERENCES


Bigl, M.F. 2013. Late stage lowering and drainage of glacial Lake Hitchcock in the Upper Valley Region of Vermont and New Hampshire. Hanover, NH: Dartmouth College.


X. APPENDIX A: SPECIES LIST WITH SCIENTIFIC AND COMMON NAMES

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
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<td>Abies balsamea</td>
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<td>Broad-leaved helleborine</td>
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<td>Micranthes pensylvanica</td>
<td>Swamp small-flowered-saxifrage</td>
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Osmunda regalis
Osmundastrum cinnamomeum
Ostrya virginiana
Persicaria punctata
Phegopteris connectilis
Picea rubens
Pilea pumila
Pinus strobus
Polystichum acrostichoides
Pteridium aquilinum
Quercus rubra
Ribes lacustre
Rubus pubescens
Scirpus cyperinus
Scutellaria lateriflora
Solidago caesia
Solidago canadensis
Sparganium spp.
Spiraea tomentosa
Symphyotrichum lanceolatum
Symphyotrichum puniceum
Parathelypteris novaboracensis
Thymus pulegioides*
Tiarella cordifolia
Tilia americana
Tsuga canadensis
Typha spp.
Vaccinium angustifolium

Sensitive fern
Royal fern
Cinnamon fern
Hophornbeam
Dotted smartweed
Beech fern
Red spruce
Canada clearweed
White pine
Christmas fern
Bracken fern
Red oak
Swamp currant
Dwarf raspberry
Woolgrass
Maddog skullcap
Blue-stem goldenrod
Canada goldenrod
Bur-reed
Rosy meadowsweet
Lance-leaved american aster
Purple-stemmed american aster
New York fern
Lemon thyme
Foamflower
Basswood
Hemlock
Cattail
Common lowbush blueberry
XI. APPENDIX B-C: ADDITIONAL MAPS

Appendix B: The Nature Conservancy Resilient Land Mapping Tool – Local Connectedness Model (Anderson et al. 2012)

Newbury Town Forest - Local Connectivity

October 2, 2016

Far Above Average (>2 SD)
Above Average (1 SD to 2 SD)
Slightly Above Average (0.5 to 1 SD)
Average (-0.5 to 0.5 SD)
Slightly Below Average (-0.5 to -1 SD)
Below Average (-1 to -2 SD)
Far Below Average (<-2 SD)
Developed


(c) The Nature Conservancy
Appendix C: Vermont Conservation Design Tiered Contribution to Biodiversity for the Proposed Newbury Town Forest (Sorenson et al. 2015)
XII. APPENDIX D-H: PHOTOS

Appendix D: NTF-1-Red Maple-Black Ash Seepage Swamp (S4)

Appendix E: NTF-2-Beaver Pond
Appendix F: NTF-3-Red Spruce-Cinnamon Fern Swamp (S3)

Appendix G: NTF-10-Red Maple-Black Ash Seepage Swamp
Appendix H: NTF-13-Vernal Pool
Part II: Rapid Ecological Assessment of the Woodchuck and Tucker Mountain Parcels

Prepared for
Bob Linck, Vermont Land Trust and
The Field Naturalist Program at the University of Vermont

By Anya Tyson
Field Naturalist Master’s Candidate
University of Vermont
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Overview

This report is a rapid ecological assessment of two adjacent properties in Newbury, Vermont. On September 17th, 2016, I visited the 142-acre parcel owned by Ted and Deborah Leach (henceforth called Woodchuck Mountain) (Map 1). On the same date, I explored the western ~100-acre slice of a 493-acre property jointly owned by several members of the Leach family (henceforth called Tucker Mountain). The larger Tucker Mountain property was placed under a conservation easement through the Vermont Land Trust in 1994. Twenty-two years later, VLT is poised to seek the funds to purchase both parcels outright at half of market value. The ultimate intent would be to transfer the land to the public domain to create a new and far more substantial zone of the Newbury Town Forest. Though currently owned by Vermont Forest, Parks, and Recreation, an additional 116-acre parcel of land further north of Woodchuck Mountain would further bolster acreage in this new Town Forest (Map 2). In total, these new additions would roughly quadruple the acreage of Newbury’s current town forest, a 189-acre parcel located further north in the township.

This assessment is intended to provide ecological context to the discussion surrounding the proposed Town Forest addition. My report specifically focuses on the slopes and summits of Tucker and Woodchuck Mountains. Ecological Planning M.Sc. candidate Hannah Phillips conducted a simultaneous assessment on the other ~400 acres of Leach family land (Part 1), and taken together, these documents represent the full acreage of the project. In addition to conducting 10-hours of wandering transects on the site, I have compiled relevant information from Jeffrey Smith’s 2010 Forest Management Plan for the Tucker Mountain parcel. I hope my findings will assist the Vermont Land Trust in making the Newbury Town Forest a reality.

After investigating Woodchuck and Tucker Mountain, I believe the most salient ecological values include:

- **Connectivity between priority habitats:** The project would conserve a total of 750 adjacent acres connecting habitat blocks prioritized by the Vermont Department of Fish and Wildlife. These blocks lie within a larger forest matrix block designated as “Tier 1” by the Nature Conservancy (Maps 3, 4, 5, 6). The land is sizeable enough to serve as a haven, as opposed to just a stepping stone, for many species on the move.

- **Ancient sugar maples:** A stand of old-growth maples crowns the unassuming high point near the western edge of the Tucker Mountain property. Though their gnarled and decadent trunks provide shelter for cavity-seeking wildlife, these trees are magnificent in their girth alone. We should preserve their longevity as a legacy for all Vermonters.

- **High-quality wildlife habitat:** Bears find an abundance of oak, beech, and berries on the slopes of Woodchuck and Tucker mountains, while white-tailed deer find shelter from snow under conifer stands on the property’s lower slopes. We would preserve valuable wildlife habitat by protecting the structural heterogeneity of these mountainside forests and hilltop openings.
Biophysical Location

Tucker and Woodchuck Mountain rise above the Connecticut River Valley near the transition between the Northern and Southern Vermont Piedmont biophysical regions. The Vermont Piedmont is characterized by abundant lower elevation hills and split into two regions based largely on climatic differences (Thompson and Sorenson, 2000). Situated astride the boundary between the cool, northern Piedmont region and the warmer southern zone, temperatures on Tucker and Woodchuck Mountain are moderate when compared with the rest of the Vermont. The wooded summit of Woodchuck Mountain, at 1,739 ft., peaks above the 1,690 ft. mowed lookout atop Tucker Mountain. This lower summit slopes towards Meadow Brook, reaching a low point of 1,200 ft. in the southwestern corner of the property.

Figure 1: View from the summit of Tucker Mountain west towards the Green Mountains.
Hydrology

In between Woodchuck and Tucker mountains, there are two human-created ponds. Flowing westward to fill these pools, the headwaters of Meadow Brook escape through small culverts beneath earthen dams. Another intermittent brook surfaces briefly on the southern boundary of the property to join Meadow Brook further downstream. Meadow Brook eventually empties in the Waits River which flows into the lengthy Connecticut River. The eastern portion of the proposed town forest flows into Hall’s Brook (see Phillip’s parallel report). I identified five forest seeps on the property and one swamp; these wetlands are discussed in detail in the Natural Communities section of this report. It is important to note that I encountered these features in mid-September of a drought year; I would expect these wetlands would swell in size and that more water would flow in the brooks under more typically moist conditions.

Figure 2 and 3: Upper manmade pond (left) and intermittent brook on southern property line (right).

Bedrock Geology – Map 7

The bedrock skeletons of both Tucker and Woodchuck Mountain are metamorphosed ocean sediments initially deposited in the Devonian Period around 400 million years before present. Around 350 million years ago, the force of the colliding tectonic plates squashed and reshuffled the horizontally-deposited layers borne of the warm, tropical Iapetus Sea. Today, the interbedded phyllites and limestone of the Waits River Formation make a wide calcareous swath north-to-south through both the Tucker and Woodchuck properties. On either side of this band, the Gile Mountain Formation is present in the form of schist, phyllite, and slate. Though not as rich in calcium as neighboring limestone layers, this formation is nevertheless far “sweeter” than the granitic basement rock that dominates the landscape further east across the Connecticut River in New Hampshire.

In my site visit, I did not locate any exposed limestone amongst the numerous schist and phyllite outcrops. Though none of the rock surfaces reacted when tested with mild solution of HCL, the property did show signs of calcareous enrichment. One possible explanation for such observations is that the Waits River limestone may erode more quickly than other strata when exposed above ground. Supporting this idea, this formation spans the saddles between rises across the property, and some of the plant species detailed in this report might attest to the calcareous presence of limestone just below the land surface.
**Surficial Geology – Map 8**

Much of the properties’ bedrock lies concealed by material of a far younger geologic vintage. Tens of thousands of years ago, the Laurentide Ice Sheet paved its progress and eventually its last retreat in a jumbled mix of boulders, rocks, and much smaller particles. The glacial till that covers the majority of Woodchuck and Tucker Mountain likely played a role in the site’s human history as a source for stonewalls and agricultural headache. A multiplicity of origin sites can be detected amongst the glacier-borne debris—for example, the granites and chunks of rosy quartz are unlike any of the onsite bedrock types. I also encountered several refrigerator- to car-sized glacial erratics on the property.

![Image of distinctive rocks and stone wall]

**Figures 3 and 4:** A visitor-compiled “museum” of distinctive rocks (left) and a section of stone wall running through the forest (right).

**Soils – Map 9**

Tunbridge-Woodstock soils are prevalent on both summits and slope of Woodchuck and Tucker Mountain. This fine, sandy loam is characterized as ‘very rocky’ due to the frequent influence of near-surface bedrock. Along topographic drainages, soils are classified as Buckland loam, described as ‘very stony’ in reference to the numerous cobbles found in this thicker matrix of till-derived soils. I confirmed the presence of rocky/stony, sandy loam based on two soil cores to a depth of 10 inches each. Mineral soil pH in these upland cores ranged from 5.5 to 6.5.
Natural Communities – Map 10

I designated natural communities based on the Thompson and Sorenson’s formative text: *Wetland, Woodland, Wildland* (2002). In the next section, I offer stand descriptions to capture the variability of distinct zones of vegetation at a finer scale.

![Northern Hardwood Forest](image)

**Figure 6:** A window into the Northern Hardwood Forest matrix natural community.

**Northern Hardwood Forest**
Sugar maple in every age class is abundant on Woodchuck and Tucker mountain. Beech, red oak, red maple occur with varying frequencies depending on microsite-specific topography. White ash and basswood are peppered into the forested matrix as a stately reminder of the sweet bedrock below. Occasionally yellow birch or paper birch careen upwards from an exposed ledge or scrap of bare ground. Striped maple are a ubiquitous understory component, often shading a sparse herb layer of seedlings and sarsaparilla. On the slopes of Tucker mountain, softwoods such as Eastern hemlock, balsam fir, and red spruce also appear with some frequency.

When humans clear a Northern Hardwood Forest, a slightly different suite of species often regenerates, which may feature white pine, red maple, and/or paper birch depending on the
length and nature of the disturbance. On Woodchuck and Tucker mountains, we see such processes at work across time and on a range of spatial scales.

As previously mentioned, the property’s matrix forest shows multiple signs of enrichment. I found extensive patches of wild ginger and several clumps of maidenhair fern scattered on both sides of Tucker Mountain Road. I refrained from splitting each swath of nutrient-loving herbs into its own patch of Rich Northern Hardwood Forest, a distinct natural community. Thompson and Sorenson endorse this type of lumping when done with discretion: “[a] large area [...] may be mapped as Northern Hardwood Forest, with the recognition that there is variability within it.”

Rich Northern Hardwood Forest

![Rich Northern Hardwood Forest](image)

**Figure 7:** Dense herb layer under sugar maple-dominated canopy.

On the northern boundary of the Woodchuck Mountain parcel, I encountered one undeniable example of a Rich Northern Hardwood Forest. Here, wood nettle and maidenhair fern carpet a shallow north-facing depression. Just over, or perhaps intermingling with the property boundary, long tubes wick away spring sap destined for pancakes. Evidence of maple sugaring seasons long past is close at hand in an assortment of rusty metal objects.

![Maple sugaring](image)

**Figure 8:** Sugaring then and now
Mesic Red Oak-Hardwood Forest
The southern ridge of Woodchuck Mountain has a direct southern exposure and a recent history of apparent silvicultural treatment. One or both of these influences support a preponderance of red oak in the canopy. Red maple, sugar maple, beech are also abundant, while hophornbeam and hemlock make infrequent appearances. Red oak seedlings are regenerating in shallow-to-bedrock soils though in some locations the understory is dominated by beech. There are multiple manmade corridors that dissect the forest on this slope; at the base there is a narrow utility right-of-way and further upslope several skid tracks. Scattered invasive buckthorn shrubs are present in these linear forest gaps. However, logging seems to have been conducted selectively, and many lovely, large-diameter oaks have been wisely left to thrive in more open forest.

Hemlock-Northern Hardwood Forest

Figure 9: Only a little light filters through the hemlock-dominated overstory

Eastern hemlock becomes more prominent than hardwoods on the lower western slopes of Tucker Mountain. Beech, maple, oak and birch still appear among the softwood. Only a few ferns dot the shady forest floor. The canopy is effective at filtering out snow in addition to light, and deer take advantage of this moderating effect in harsh winter conditions.
Red Maple-Black Ash Swamp

A few red maples and black ash poke up through sedges and ferns in this small opening in the forest. Sensitive fern and sedges (*Carex* spp.) are abundant interlaced with cattail. Swamp saxifrage and cinnamon fern also grow out of muck. The swamp is not far from a house and human-enhanced pond just over the property line. This area may see more use because of this nearby entry point. In addition to porcupine footprints, all-terrain vehicle tracks were seen at the end of the swamp (Figures 11, 12 below).
Seeps
In each of the seeps, sedges, bryophytes and ferns are well-represented. A thorough trip during the peak flowering season would likely yield a far more detailed species list at each of these locations. Beyond floristic diversity, ground-water kept at a near-constant temperature above freezing year-round which supports vegetation beyond the bounds of the typical growing season. Bears make use of this early-spring source of welcome nourishment (Thompson and Sorenson 2002). Despite similarities, each of these seeps is distinctive in topographic position or associated plant community. I have described them based on their location on the Woodchuck and Tucker Mountain properties. I also make mention of any threats I observed near these resources.

Figure 13: “Northern Seep”
The small wetland furthest north on the property is open except for a spindly red maple and unidentified standing snag. This seep may be the headwaters of an ephemeral/ intermittent watercourse that flows eastward off the property. Yellow sedge, jewelweed, royal fern, and sensitive fern grow abundantly here. A soil core to 10-inches of depth revealed pH measurements ranging from 6.5 to 7.5. Equisetum spp. grows densely over a rock wall that cuts across a narrow portion of this seep. A well-used ATV track is within 50 ft. of the seep’s margin, and I encountered one set of tracks running right towards the wetland.
Figure 14: “Mid-slope Seep”
A bedrock ridge makes a horseshoe around this secluded seep. Sugar maple and white ash are present in an open canopy that shades a lush growth of cinnamon and sensitive fern. A round depression of bare muck, three meters in diameter, appears to hold water for much of the season, and as a result, this habitat feature may be important to amphibians. This seep extends downslope linearly until reaching the road and intermittent brook. Raccoon and deer tracks crisscross this narrow zone, while marsh fern and interrupted fern are scattered along its margins.

“Southern Softwood Seep”: Groundwater puddles in the concave bowl beneath steep southwest-facing slopes. This seep is located amongst a softwood stand that has been disturbed during logging activity in 2010. The remaining red spruce and regenerating balsam fir convey a more northern feel to this zone, and a small patch of sphagnum moss and an aberrant larch are found nearby. A somewhat sparser understory of sensitive fern and bryophytes grow amidst open patches of circumneutral muck.

“Western Seep”: This tiny seep is located between the narrow margin of a 2010 clearcut and the property line. The saturated soils may have influenced the boundaries of that harvest event. Long beech fern and thick mosses are abundant here beneath the shade of hemlock and white pine.
This gentle depression is surrounded by sugar maples and large-diameter white ash. Cinnamon fern, jewelweed, and sensitive fern blanket sodden, mucky substrate. This seep is within view of the Red Maple-Black Ash swamp and a human-enhanced pond on an adjacent property. There are black pipes running up from this pond, one to a springbox within the boundaries of the Leach parcel and another further upslope into the margins of this seep.

**Figure 15 and 16:** Black pipes and springbox within the Leach property boundaries.
Current Vegetation – Map 11

The following zones do not fit neatly into the natural communities concept. Nevertheless, I cannot paint a complete ecological picture of the site without describing the distinct character of each.

“Mowed and altered summit”: The residents of Newbury are most familiar with the bald top of Tucker Mountain, and this gentle peak would surely remain a major attraction in the potential Town Forest. Ecologically, the frequently mowed summit might appear barren and may represent a barrier to some forest species. However, grassland-obligates species could find suitable habitat here, and a breeding bird survey might confirm this suspicion. I caught brief glimpses of unidentified sparrows and American kestrel from the summit. Botanically, the summit has areas of mowed graminoids, wildflowers and invasive herbs. These fields are interspersed with “hedgerows” of regenerating trees including red maple, pin cherry, aspen, and white pine. Lowbush blueberry shrubs are abundant, though this acidophilic plant seems out-of-place in proximity to rich sites elsewhere on the property. Generations of agricultural use may have depleted the soil of cations in these locations to make current growing conditions more acidic. Frequent mowing has also led to tiny, dwarf versions of lycopods such as ground cedar and other herbs.
Aesthetically, the cleared mountaintop offers some of finest Vermont views. The forested peak of Woodchuck Mountain, though slightly taller, conversely leaves everything up to the imagination. At this point, generations of Newbury residents have maintained the beloved Tucker Mountain vistas. There is clear evidence, however, of this being a tough love at times; the Beer Bottle-Cigarette Butt unnatural community is never far from sight in the foreground of lovely mountainscapes.

**Figures 18, 19 and 20:** Party debris around a large fire ring (left), a large white pine “wolf tree” (center) and a young white pine seedling joins the open-grown ranks(right)

“Recent Forest Treatments”: The majority of the Tucker Mountain Parcel was selectively logged using old skid roads sometime between 2010 and 2012. Much of this area experience earlier forest treatments in the early- to mid-1990’s. Many large white pines, sugar maples and red oaks have been left standing. A younger, dense-grown cohort of red maple, paper birch, and other hardwoods was also left to grow in patches. The lanes in between these shrubby forest are thick with blackberry, bracken fern and hay-scented fern. I found bear and moose scat in these zones.

**Figures 21, 22, and 23:** Large pines and maples standing above regenerating forest (left), moose droppings (center) and berry-laden bear scat (right).
Figures 24 and 25: Aerial photo from 2009 (left) and from 2010 (right). Tucker Mountain Summit visible on the right-margin of both photos. Though older logging corridors may be seen in the first photo, they are greatly expanded in the second photo.

“2010 Clear Cut”: A few acres of forest in the extreme western portion of the property were clearcut in 2010. Blackberry and white pine seedlings grow vigorously here. Two large white pines were left as seed sources in the cleared area, and a large open-grown sugar maple lingers on the forest’s edge.

“Older Clear Cut”: Around 50 years ago, this stand may have been clearcut. Now, red spruce, balsam fir, paper birch, red maple grow densely on this steep west-facing slopes. I did not venture far into this zone, but my observations from the edges agreed with the stand description I encountered in Smith’s 2010 Forest Management Plan.

“Common Juniper”: A small (< 0.5 acre) patch of dense common juniper grows head high. This shrub and the presence of large, many-branched white pines speaks to this zone’s intensive use as a pasture within the last century.

“Old Fields”: Stands of white pine form a patchwork within the hardwood matrix north of Tucker Mountain Road. Oriented along stone walls and next to signs of old road corridors, these patches were likely once fields or pasture, hinting at the former order imposed upon the now-forested landscape.

Figure 26: Looking through the open mid-story of a white pine stand into the thick green of mixed-age hardwoods.
“Red Pine Stand”: Around 10 - 20 red pines cluster on a slope otherwise dominated by white pine and more typical northern hardwoods. These trees may have been planted by early settlers on Woodchuck Mountain.

“Spruce-fir Dominated Forest”: The drainage southwest of Tucker Mountain summit is dominated by red spruce and balsam fir. Though I have included this zone within the Northern Hardwood natural matrix, this young, uneven aged forest may represent a distinct natural community. Perhaps cold air pools in this slight topographical depression favored by softwoods.

“Dense-fir Regeneration”: The larger softwood forest described above includes a 1-2 acre cluster of regenerating balsam fir. This doghair thicket is a small patch of excellent snowshoe hare habitat. This prey species in turn is favored by fisher and bobcat alike. Various lycopods and ferns fill in around the edges of the firs.

“Man-made Ponds”: I visually surveyed both ponds for signs of wildlife. A great blue heron’s track traced a similar route along the margins of the pools. Both ponds showed signs of old beaver activity, but seemed to have been abandoned by the large rodent a number of years ago. A large snag next to the lower pond presents an ideal perch for raptors. I glimpsed numerous crayfish and salamanders from the bank, woefully unable to catch or identify members of either taxa. Diving beetles and small fish moved in frenetic schools. I managed to catch and identified one leopard frog.

Figure 27, 28, and 29: Aquatic and semi-aquatic wildlife of Woodchuck and Tucker mountains. A leopard frog and crayfish clay from man-made ponds (left, center). A wood frog caught upslope in the forest above Tucker Mountain Road (right).
Figure 30 and 31: A long-standing property boundary is clearly delineated by long-standing maples (left) and two such maples towering above younger forest cohorts (right).

“Monarch Maple Stand”: In this zone, pole-sized maples and other scattered hardwoods surround occasional canopy-dominant behemoths. Most of these are sugar maples, but there are also a few gargantuan basswood and red oak. Though only a handful of the legacy trees are captured within property’s boundaries, they are nonetheless one of the most alluring aspects of the entire ~200-acre area. The tree featured on the cover of this report has a hollow base spilling over with porcupine droppings, and many of the other trees are partially rotted at the base with occasional dead limbs and numerous cavities. These decadent features are valuable to a host of wildlife species, and enhance the unique character of the larger stand.

Additional Notes on Wildlife Value

This property has abundant, healthy red oaks in addition to moderately-healthy beech stands. These trees provide a hard mast food source for rodents, deer, turkey, skunks, and bear. Logging activity in the last five years have created ideal conditions for berries; all three bear scats found on site were filled with tiny seeds. There are also a few old apple trees on the property. Striped maple, hemlock, and seeps provide browse and vegetation for herbivores during leaner times of year.
In terms of potential bird habitat, several species of neotropical migrants including the chestnut-sided warbler and common yellowthroat benefit from forest canopy gaps (Hagenbuch et al.). In addition, cavity-nesting species will find ample standing dead snags on this property. Upslope of the 2010 clear-cut, I found an eggshell large enough to suggest it came from the depredated nest of a buteo, turkey vulture or possibly turkey.

**Figure 32, 33, 34, 35, and 36:** Examples of delectable soft mast (top left, top center) and looking up the trunk of an American beech (top right). Canid scat (lower left) and large egg (lower right).

**Human History – Map 12**
Tucker Mountain was settled and mostly cleared prior to 1808, and the following excerpt from the *History of Newbury* vividly depicts some of the mountain’s first residents:

> James [Carter] [...] settled on the highest cultivated land in town, on the hill formerly called “Carter’s mountain,” but now sometimes called “Tucker’s mountain,” from John Tucker and John W. Tucker, his son, who afterward owned a part of the Carter farm. [Carter] was a man of affairs, often being selectman, lister, etc. He built about 1810, a two story house, still standing on the mountain [in 1902]. He was known as “Mountain Carter,” and was a man of great size, and his wife, who was his cousin, was also very large, both weighing, it is said 700 lbs.

-F. Wells, 1902
In addition to the Monarch Maple Stand, large-diameter witness trees often accompany the extensive lengths of stone walls on the property. The current vegetation also reveals other aspects of the site’s land use history. The northwestern part of Woodchuck Mountain parcel was likely used as a woodlot and sugarbush for generations, whereas the eastern half of this parcel, north of the road seems to have experience more concentrated agricultural and residential use. In between stone walls in this zone, one finds evidence of old road corridors, where opportunistic paper birches sprouted linearly on exposed mineral soil. There is an old foundation and apple tree in a clearing near the two structures that are still standing just north of Tucker Mountain Road.

**Management Concerns and Recommendations – Map 13**

I encountered invasive species such as multiflora rose, buckthorn, and honeysuckle in some of the logging corridors and alongside Tucker Mountain Road. I am pleased to report that these species were very limited to entirely absent in the forest interior. In order to prevent the spread of weeds into the forest, I recommend that any trail systems be sited whenever possible in existing zones of disturbance. However, in the event that the land becomes a Town Forest, I might encourage a new footpath be routed through the Monarch Maple Stand in order to expose visitors to the impressive legacy trees. I documented ATV tracks encroaching near two of the property’s seeps, and I would recommend that these forested wetlands have a protective buffer enforced in the future to protect their vegetation and saturated soils from logging or recreational vehicles.

Along with hiking, wildlife viewing, hunting, and ATV-riding, visitors to Woodchuck and Tucker Mountains will find ample opportunities to foraging. Within my one-day visit, I encountered lobster mushrooms, king boletes, and chaga fungus in addition to the heavy berry crop. Judging by the $30/pound price tag for lobster mushrooms at a downtown supermarket, the harvest of forest products might join silviculture and maple sugaring on the list of potential future “working uses” of the proposed Newbury Town Forest.

*Figure 37: A particularly large chaga fungus growing from a paper birch.*
Beyond their specific flora and fauna, Woodchuck and Tucker Mountains contribute to the surrounding landscape through the ecosystem services they provide. An undeveloped and largely forested set of mountains makes the larger watershed more resilient to flooding than the same area developed and partially covered in non-permeable surfaces. Though nearly a century has passed since the devastating floods of 1927, residents of the Upper Connecticut River Valley can anticipate flood conditions to reappear over the next one hundred years. When considering the potential Town Forest, flood mitigation and the carbon sequestered by well-managed forests are two public goods that should not be ignored. The specter of climate change joins in as an unignorable entity in the Newbury Town Forest discussion. The natural communities and vegetation zones I have documented on the site can be expected to change over the coming decades, and management activities will have to adapt accordingly.

Figure 38: The site of the Bradford-Piermont bridge, swept away by the Waits River on Nov. 4, 1927. (photo: Bradford Historical Society) Meadow Brook, with its headwaters situated between Woodchuck and Tucker mountains, flows into the Waits River upstream of where this photo was taken.

In some ways, Tucker Mountain already acts as the “unofficial” Newbury Town Forest. Based on the current uses at the site, I anticipate certain challenges in managing the forest for recreation, silviculture, and wildlife habitat values. Property boundaries are inexact and may require additional surveying. Some unauthorized “takes” will likely need to be curtailed—such as the pipes draining water from the narrow drainage southeast of Tucker Mountain and ATV trails through sensitive areas. Going forward, there may be tension between the ATV community and other user groups such as hikers, wildlife seekers, or some amount of conflict between the Vermont Land Trust and current users. Hopefully, messengers from within the fabric of Newbury communities can help foster renewed stewardship of the Town Mountain. Certainly, there will be ample opportunities to leverage shared values at a place where people gather to play, hunt, and watch the sunset. Vermont’s town forests thrive on precisely this sort of common ground.
Figure 39: Possible stakeholders in the management of Newbury Town Forest? Photos are from Tucker Mountain’s unofficial Facebook page (https://www.facebook.com/pages/Tucker-Mountain/151045751577958?fref=ts)
Summary

After three days of field- and computer-based investigations, I am convinced of the rich and varied ecological value of the Woodchuck and Tucker Mountain properties. Though far from pristine—this land has been in use for agriculture or silviculture for much of the last 200 years (Wells, F. 1902)—nutrient-rich soils and topographical complexity nevertheless abound. The most recent forest management actions would seem to have improved wildlife habitat. As testament, the property currently boasts abundant acorn and berry crops.

This zone of wildlife-friendly forest stitches together multiple blocks of core habitat prioritized by Vermont Fish and Wildlife Department (Sorenson and Osborne, 2014). Furthermore, these core habitat blocks fall within a forest matrix block identified by the Nature Conservancy as a Tier 1 “contiguous area whose size and condition allow for the maintenance of ecological processes, [and] viable occurrences of [...] embedded species populations (The Nature Conservancy (TNC) Eastern Conservation Science, 2006).”

Finally, this land enriches the living history of the Upper Connecticut Valley with the stories contained in its stone walls and towering maples. Based on social media, Vermonters venture out nearly every fair-weather weekend to enjoy the mountaintop scenery on Tucker Mountain. Situated at the confluence of social and ecological benefits, the proposed Newbury Town Forest is a project worthy of statewide support.

Figure 38: Here’s to the new Newbury Town Forest!
Species Lists

Herbs
Sarsaparilla – Aralia nudicaulis
Wild ginger – Asarum canadense
Maidenhair fern – Adiantum pedatum
Jack-in-the-pulpit – Arisaema triphyllum
Herb Robert – Geranium robertianum
Canada mayflower – Maianthemum canadense
False Solomon's seal – Maianthemum racemosum
Jewelweed – Impatiens capensis
Cinnamon fern – Osmunda cinnamomea
Interrupted fern – Osmunda claytoniana
Royal fern – Osmunda regalis
Indian Pipes – Monotropa uniflora
Beech drops – Epifagus virginiana
Long beech fern – Thelypteris phegopteris
Hay-scented fern – Dennstaedtia punctilobula
Ostrich fern – Matteuccia struthiopteris
Fen Grass-of-Parnassus – Parnassia glauca
Waterleaf – Hydrophyllum virginianum
Blue cohosh – Caulophyllum thalictroides
Wood nettle – Laportea canadensis
Goldenrod – Solidago spp.
Goldthread – Coptis trifolia
Partridgeberry – Mitchella repens
Rock polypody – Polypodium virginicum
Marsh fern – Thelypteris palustris
Trillium – Trillium spp.
Partridge berry – Mitchella repens
Milkweed – Asclepias spp.
Pearly everlasting – Anaphalis margaritacea
Wild strawberry – Fragaria virginiana
Mullein – Verbascum thapsus
Yarrow – Achillea millefolium
Swamp saxifrage – Saxifraga pensylvanica
Cattail – Typha latifolia
Large-leaved aster – Aster macrophyllus.

Lycopods
Bristly clubmoss – Spinulosum annotinum
Ground cedar – Diphasiastrum digitatum
Shining clubmoss – Huperzia lucidula
Trees
Sugar maple – *Acer saccharum*
Red Oak – *Quercus rubra*
American beech – *Fagus grandifolia*
Red maple – *Acer rubra*
White ash – *Fraxinus americana*
Basswood – *Tilia Americana*
Eastern hemlock – *Tsuga canadensis*
Striped maple – *Acer pennsylvanicum*
White pine – *Pinus strobus*
Red spruce – *Picea rubens*
Balsam fir – *Abies balsamifera*
Red pine – *Pinus resinosa*
Black ash – *Fraxinus nigra*
Hophornbeam – *Ostrya virginiana*
Black cherry – *Prunus serotina*
Yellow birch – *Betula alleghaniensis*
Paper birch – *Betula papyrifera*
Quaking aspen – *Populus tremuloides*
Big-toothed aspen – *Populus grandidentata*

Shrubs
Blackberry – *Rubus allegheniensis*
Common juniper – *Juniperus communis*
Lowbush blueberry – *Vaccinium angustifolium*
Hobblebush – *Viburnum alnifolium*
Thimbleberry – *Rubus odoratus*
Staghorn sumac – *Rhus typhina*

Sedges
Yellow Sedge – *Carex flava*

Invasive Species
Buckthorn – *Rhamnus* spp.
Honeysuckle – *Lonicera* spp.
Yellow Toadflax – *Linaria vulgaris*
Common barberry – *Berberis vulgaris*
Cypress Spurge - *Eupatoria cyparissias*
Multiflora Rose – *Rosa multiflora*
**Wildlife**
* indicates detected by sign only

**Birds**
Blue Jay
American Goldfinch
Hermit Thrush
White-breasted Nuthatch
Red-breasted Nuthatch
Black-capped Chickadee
Ruffed Grouse
Ovenbird
Connecticut Warbler
Hairy Woodpecker
Chestnut-sided Warbler
Black-and-white Warbler
Black-throated Green Warbler
American Robin
American Kestrel
Mourning Dove
Turkey Vulture
Common Raven
Great Blue Heron*
Yellow-bellied Sapsucker*
Pileated Woodpecker*

**Mammals**
Red squirrel
Eastern chipmunk
White-tailed deer*
Coyote*
Black bear*
Moose*
Striped skunk*
Raccoon*
Porcupine*

**Amphibians**
Leopard frog
Wood frog
unknown salamander
Resources Cited


